The American Biology Teacher

Vol. 6 NOVEMBER, 1943 No. 2

PUBLISHED BY
The National Association of Biology Teachers

Entered as second-class matter October 26, 1939, at the post office at Lancaster, Pa., under the Act of March 3, 1879.

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THE AMERICAN BIOLOGY TEACHER

Publication of the National Association of Biology Teachers.

Issued monthly during the school year from October to May.

Publication Office—N. Queen St. and McGovern Ave., Lancaster, Pa.

Editor-in-Chief—JOHN BREUKELMAN, State Teachers College, Emporia, Kan.

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Subscriptions, renewals, and notices of change of address should be sent to the Secretary-Treasurer, G. W. JEFFERS, Farmville, Va.

The entire Staff List will be found in the October and February issues.

Annual membership, including subscription, $1.50.

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Biology Teaching in War Time—Some Suggestions for Emphasis[1,2]

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The boys and girls in our secondary schools today are at the threshold of life in a world upheaval. They must be initiated into a society fighting for its existence. They also must be prepared to enter the struggle to preserve a great heritage and to carry on after the crisis. The responsibility rests upon educators to help the adolescent interpret the world in which he is growing; to give meaning and direction to the present turmoil; to equip their charges, the boys and girls of America, with the practical understandings and skills needed to live effectively through the period of war and its aftermath.

To this end the entire curriculum must be directed, and to this end the contribution which science instruction has to make is indispensable. Many of our units of instruction in Biology take on added significance and in some of the units, new emphases are indicated in the light of the state of our world at present and its probable state in the near future. The 1942 revision of the New York City biology syllabus[3] is a step in this direction. In some instances, however, this syllabus does not go far enough. The following suggestions are presented in the hope that they will contribute toward making our biology teaching even more functional in the lives of our children. Perhaps, too, others in our Association will be stimulated to think about the problem and make additional suggestions.

PHYSIOLOGY UNIT

Key to references:

F–N, *Food and Nutrition*—American Red Cross, Washington, D. C., 25¢.
F–A, *First Aid Textbook*—American Red Cross, Washington, D. C., 60¢.

Nutrition. Emphasize the following:

A. The three principal functions of foods (F–N, page 7).
B. Food needs (F–N, pp. 36–42). It is suggested that these charts be enlarged for class use. They may be opaque-projected or made into lantern slides.

[1] Reprinted from *The Teaching Biologist*, January, 1943, Vol. XII, No. 4, pages 49–55.

[2] I am indebted to the 1942 Summer Science Workshop at Teachers College, Columbia University, whose consideration of war and post-war problems have stimulated these suggestions.

[3] A Syllabus in Tenth Year Biology—N. Y. Association of Biology Teachers, July, 1942.

C. Food values (F–N, pp. 43–52). Some actual food testing done in conjunction with the showing of these charts will help give them real significance.
D. Meeting food needs—diet analysis (F–N, Chapter III).
E. Demonstrate where possible (and where not possible to demonstrate—discuss) reasons for "Do's and Don'ts" in food preparation (F–N, p. 69).
F. Substitutions in case of food shortages based upon nutritional values.
G. The nutritive value of leftovers—the importance of food conservation.
H. The after-the-war problem of feeding the hungry peoples of the world (1).

Circulation. Emphasize the following:

A. Shock (F–A, Chapter V).
B. Stoppage of bleeding (F–A, Chart, p. 69; also pp. 71–82).
C. Prevention of infection (F–A, pp. 64–71).
D. Fainting, (F–A, pp. 198–200).
E. Blood banks. Consider blood typing—human blood types and the use of preserved blood and blood products in the treatment of war casualties. Emphasize the fact that the effect on the recipient is in no way affected by the color, nationality, or religion of the donor.

Skeletal system. Emphasize the following:

A. Fractures (F–A, pp. 131–141). Confine emphasis to what *not* to do. *Omit* treatment beyond recommendations given on page 135 (F–A).
B. Sprains and dislocations (F–A, pp. 171–173).

Respiration. Emphasize the following:

A. Partial pressure changes and the ways in which the human body can be adjusted to them. Include such phenomena as altitude sickness and the devices used to overcome it.
B. Artificial respiration (F–A, Chapter VII). It is suggested that the cooperation of the Health Education teacher be obtained to supervise practice in the gymnasium.

Heredity Unit

It is assumed that through the study of reproduction including mitosis and meiosis, the concept has been established that in passing from one generation to the next, chromosomes are "shuffled." This concept should now form the basis of developing the following understandings:

1. The distribution of primary races of mankind—Caucasian, Negro, Pygmy, Mongoloid, etc.—may be explained in terms of geographic isolation. (Use world maps, or better—globes.) Where these races are contiguous, mixtures occur, viz., Caucasian-Mongoloid types at junction of Europe and Asia.

2. Within and between these primary areas—Europe, Asia, the Americas, Australia—constant migrations are known to have occurred in historic times. There is evidence, too, that extensive migrations have occurred in prehistoric times. Hence our present national groups—Englishmen, Frenchmen, Germans, Russians, etc.—do not represent genetically distinct populations. Note: This is not to deny the existence of localized and limited neo-isomorphism (the tendency of people in a geographic area or originating in such an area to resemble one another). Such neo-isomorphism may be explained genetically as follows:

Consider a village, population about 2000 in the year 1942. Now let us trace the ancestry of an individual, X, back 100 years to the year 1842.

individual	X—year 1942
parents	2
grandparents	4
great grandparents	8
great-great grandparents	16—year 1842

Theoretically, in 1642, the population of the village must have been $2000 \times 2048 = 4{,}096{,}000$. But historical records show a population never exceeding 2000. Hence the present population must be sharing many of the chromosomes of the original population. These people are, therefore, in a real sense relatives. Hence they tend to resemble one another.

3. National groups do differ from each other in *cultural* characteristics (language, food preferences, social customs, etc.), but these are predominantly environmental, i.e., acquired *after* birth. There is no evidence that the cultural traits that distinguish national groups are hereditary in a genetic sense. There is, on the other hand, ample evidence that most of these traits are environmentally determined.

4. People of various national origins are being assimilated into, and in the process contribute to, our changing American culture. (Consider the national origin of different

pupils of the class and their respective languages, food preferences, and customs had their ancestors *not* migrated to America.)

5. Consider, too, how our lives have been enriched by arts and sciences that had their origin in "foreign" cultures.

6. There is evidence that even physical traits (genetically determined) may be modified by a new environment (2) (2a) (2b) (2c) (2d).

7. The recent and present geometric rate of development of communication and transportation facilities will in the future, more than ever before, bring into contact various peoples of the world. It is a challenge to think of the probable cultural pattern of the world of tomorrow.

Behavior Unit

Hitherto, this unit has been confined generally to the study of tropisms, the nervous systems, and the endocrine system. The following understandings should be developed:

1. Standardized tests have been devised to measure talent and intelligence. Environment is an important factor in the development of talent and intelligence (3) (3a).

2. Individuals in a large group, when tested, tend to be distributed in accordance with the curve of normal distribution. When two groups are compared, there is usually considerable overlap between the two curves. We tend erroneously to distinguish between individuals in this overlap because of our tendency to identify the individuals with their respective groups. We tend, in other words, to think in terms of the average or "typical" member of the group and to identify every individual in the group with this type. This leads to unwarranted discrimination against individuals. Thus, in some parts of our country, Negroes are denied educational opportunity; Jews are excluded from certain apartment houses, and both are discriminated against by employers in a variety of businesses. In some parts of Europe, the conception of the "typical" American, built up in the minds of Europeans by their experiences with a limited number of tourists or convention-goers, has resulted in anti-American prejudice. The habit of generalizing on the basis of limited experience is unscientific and, in this instance, it is dangerous. There is a real scientific basis for the fundamental principle of our democratic society—that in our political, economic, and social life, we deal with a person as an *individual* regardless of the group into which we may be tempted to classify him. Failure to vote for an otherwise-qualified candidate because he is a Catholic, failure to admit an otherwise-qualified student to a medical school because he is a Jew, failure to admit an otherwise-qualified worker into a trade union because he is a Negro, are symptoms of national inefficiency. In times of peace such inefficiency hinders progress; in time of a national crisis, it may prove disastrous.

3. Individuals differ in their potential abilities. An individual is happiest when engaged in an occupation that calls for the potential abilities that he possesses. Opportunities abound for war and "reconstruction" services for all. (At this point students might be informed about the variety of military occupations. Moreover, they might be made acquainted with some of the army and navy psychological tests.) This unit can be made to play an effective part in pre-induction guidance and in morale building.

Health Unit

References should be made to the following:

1. Military sanitation in camp and in the field—water supply, sewage disposal, etc.

2. The control of contagious diseases in the armed forces. Inoculations—venereal diseases, etc.

3. The organization and operation of an army medical unit.

4. The potentialities of the airplane as a secondary vector of disease. The international scope of community health problems. The work of the Rockefeller Foundation and the health agencies of the League of Nations. The control of epidemics and the task of restoring normal health conditions after the war (4).

5. The health problems involved in emergency housing around new munitions plants.

Evolution Unit

After having established the concept of change through the ages, apply this concept to the evolution of man as a social organism. Trace the development of human society from the family group, through the tribe (refer to the Bible), monarchy, and nation. Consider how a Democracy, because it is organized on a basis of adaptation to change, is ultimately (or at least up to the present) the most stable social organization. Some

consideration might be given to the League of Nations after World War I, why it failed, and the new world society now being planned. "With science we are turning a corner in the long road of human evolution. It is the newest thing since the ice age and the most potent. It is intelligence in action. . . . Science is the final, and invincible, ally of peace and scientific war is destined to be a contradiction in terms." James T. Shotwell, "War as An Instrument of Politics."

Ecology Unit

After having established the concept of the interdependence of organisms in a biotic community, apply it to civilized man as an organism dependent upon plants and animals of worldwide distribution. Show the need for the free interchange of goods. Refer to the Atlantic Charter.

A word of caution is in order at this point lest the biology teacher depart from those elements of science teaching which have given to science its unique place in the curriculum—exposure of the pupil to direct, firsthand experience, use of the experimental method, emphasis upon pertinency, adequacy, and reliability of evidence, distinction between hypothesis, theory, and fact. The implementation of these topics with appropriate demonstrations, experiments, charts, and reference readings is a challenge to the teacher of Biology and we may confidently hope that he will rise to the occasion. The pages of *The Teaching Biologist* might well be used as the medium of exchange of ideas in this area. They can hardly be put to better use at this time.

There will be some, no doubt, who will object that many of the topics listed fall into the field of the Social Studies and that these topics are, therefore, not the proper concern of the biology teacher. The reply to such objection might well be made in the words of Bernal (4):

"Natural and social science now overlap to such a degree that it is difficult to say whether such questions as nutrition, soil conservation and technical unemployment lie in one field or the other. The important thing, however, is not who should teach about these things, but that they should be taught about. Ideally, close collaboration between natural and social science teachers can produce a balanced presentation, but failing that, one or the other could equally carry on this task."

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After the Pages for this issue had been made up, an important addition was made to the purposes of the Chicago Meeting (page 41), namely the consideration of the National Commission of Science Teachers, which was described in the president's report in the October issue.

An Experiment in Biology Teaching

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The Troy State Teachers College has in the freshman and sophomore years what is called the *General Education Core*. "The term, General Education Core, is applied to a group of comprehensive courses and related experiences planned to produce the sound scholarship and cultural background needed by the student (1) in solving his own personal problems on a sound social basis; and (2) in dealing as a citizen with the community, regional, national, and world problems which confront him in current family life, creative and recreational activities, uses of resources, social and economic situations, and changing values"—the college catalogue, page 29.

In the freshman year the general education core is divided into two parts: 1. Bio-Social Development of the Individual, 2. The Arts in Individual Development. In the bio-social core, human biology is credited with 9 quarter hours, health and physical education with 3 hours, general psychology with 3 hours, and problems of modern society with 6 hours. Other fields of knowledge may be drawn upon, such as anthropology, ecology, etc., to contribute to the ends sought. These are all integrated to bear upon the objective—personal and social development. All regular students are required to take this core curriculum, and, in addition, each student elects other courses in which he is especially interested. Special students are not required to take this integrated work, but may elect any courses they may wish. Other courses than the core are of the usual type. Incidentally, the high schools of Alabama now have a similar set-up.

In the fall of 1942 the freshman class, with the bio-social teaching staff, having in mind that personal and social development was the goal of the year's work, made an analysis of the component factors of the problem. It was early decided that heredity plays a big part. One student remarked that everything they considered seemed to head into heredity. Admitting that they knew very little about the subject, the students decided that an intensive study of heredity should be made for eight or ten weeks, the class meeting with the biology instructor for two hours daily. Thus, the subject was chosen by the students themselves, arriving at the conclusion they needed a knowledge of it.

The biology instructor on the staff divided the topic into three major problems: 1. How do we inherit? 2. What do we inherit? 3. What implications has heredity for personal and social development?

These major problems were then broken down into detailed related problems. Each day there was a group of these placed on the board as an assignment for study. References to the text, library books and periodicals were given, and the class was divided into small groups for special study and reports.

The reports, which were usually made the next day, were followed by questions

by the staff and members of the class, discussions, and lectures. On the blackboard and placards the students presented drawings of a series of stages of soma cell division, spermatogenesis and oogenesis, illustrations of the Mendelian laws, etc. These subjects were then discussed.

Vocabulary and thought tests were given at intervals. Written reports on aspects of the subject were handed to the instructor. Finally a stiff examination, composed of original problems involving a fairly thorough knowledge of heredity, was given. This examination revealed not only an excellent grasp of the subject but ability to apply the information acquired.

In similar fashion the subject of nutrition was chosen by the class as their second problem. It was handled in essentially the same way. Metabolism, the respiratory, circulatory, and digestive systems were studied in some detail. Laboratory experiments in food testing and digesting were carried out, and the dissection of the foetal pig, with reference to the organs of respiration, circulation, and digestion were made. These experiments were made by the students working in small groups. Of course a study was made of the number of calories needed daily by individuals of different ages and different activities, balanced diet, the role of vitamines, malnutrition and nutritional diseases.

The third problem attacked by the class was sex and reproduction, with particular reference to its influence upon individual and family life. Asexual and sexual means of reproduction in plants and animals were studied in the same way the other topics had been. The development of mammalian embryo was discussed in lectures by the instructor, using embryos of the squirrel, guinea pig, and man—both in and out of the uteri—as demonstrations. The effects of sex hormones were given special attention, with reports and discussions on various aspects of the subject.

The results of the year's work were the most satisfactory we have ever obtained, in many years of teaching freshman biology. This, we conclude, was brought about largely as a result of free discussion on the part of the students, in which they arrived at a sense of their needs and made their own choice of what they should study. Thus interest was aroused and maintained throughout the work.

If some such plan were followed with high school students and college freshmen there would, we believe, be better results obtained in biology teaching.

BY THE WAY

A Bread Mold culture can be made very easily. Put a wet piece of toweling paper or a layer of moist sand in the bottom of a plate, lay a slice of bread on the paper or sand, cover with a bell jar or inverted bowl and set aside in a warm, preferably dark place for a couple of days. In the course of a few days all stages in the development of the mold may be seen. An ordinary hand lens is strong enough to see the formation of the spore-bearing bodies and their changes in color as they ripen.

Projection Slides of many types can be made by the method suggested in *By The Way* in the February issue. We have mounted not only insect wings but also several other insect parts, such as legs, mouthparts, antennae, etc. We have also mounted fish scales, feathers, skeletonized leaves, seed "parachutes" of the dandelion, entire small animals such as centipedes and nerve-wings, and many other objects. Anything that is of suitable size and semi-transparent or translucent is worth trying. One hazard not mentioned in the February item is that of sealing moisture in the mount. The slide should be tied with string or held in a clamp and placed on a warming table or radiator until all moisture has been driven off, then sealed with permanent binding tape.

(Continued on page 48)

The Mathematics of Digestion

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In the common run of life we often come upon the question, "How much food does one need to carry on his daily physical activities?" This is fairly difficult to compute, for to accomplish it successfully we must consider the type of food eaten, the number of calories, and the work done (in the sense of expenditure of energy), whether it consists of voluntary or involuntary muscular movements.

However, let us take a specific example and, with the aid of physics and chemistry, determine as nearly as possible what one needs in the way of food to perform this certain physical act. We can also compute how much air must be inhaled to oxidize this food and how much carbon dioxide is afterwards breathed out. As an example let us choose some sports event; for the sake of simple numbers we will use the rope-climb.

An average man of 150 pounds climbs the standard rope used in such events, a distance of 20 feet, doing 150×20, or 3000, foot-pounds of work (the friction in the act is negligible).

Now, physics tells us that 3 foot-pounds of work require 1 small calorie or 0.001 large calorie. Our athlete accomplishes 3000 foot-pounds of work and therefore uses 1000 small calories or one large calorie of energy.

For convenience we will feed him pure table sugar for energy. Since there are 100 large calories in 4 teaspoons or 25.5 grams of sugar (as any calorie chart states), we will take the number of large calories, divide by a hundred, and multiply by 4 to find the number of teaspoons or by 25.5 to find the number of grams. This gives us the answer to our first question; to climb the 20-foot rope the 150-pound man would have to eat the equivalent of 0.04 teaspoons or 0.255 grams of common table sugar.

Now let us observe how much air he must breathe to oxidize this food and how much carbon dioxide he exhales. The chemist has told us that table sugar is pure sucrose and that before it can be assimilated the complex sugar $C_{12}H_{22}O_{11}$ is digested in the small intestine, broken down into the simpler sugars dextrose and levulose by the action of water in the presence of an acid.

$$C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$$

The weight of the sugar is likewise changed, in that it has combined with water. To find the weight of new sugars we place an x over the combined new sugars and beneath them their molecular weights. Over the sucrose we place the weight of sugar to be eaten, 0.25515 grams and beneath it its molecular weight.

$$\underset{342}{\overset{0.255}{C_{12}H_{22}O_{11}}} + H_2O \rightarrow \underset{360}{\overset{x}{C_6H_{12}O_6}} + C_6H_{12}O_6$$

$$\frac{0.255}{342} = \frac{x}{360}$$

$$x = 0.269 \text{ grams}$$

The weight of sugars to be assimilated has therefore jumped to 0.269 grams. To find the volume of oxygen necessary to oxidize this weight of sugars the unknown x is placed over the O_2 in the equation of the oxidation of these sugars, while the standard number 22.4 is placed under it. The molecular weight is placed beneath the sugar, and the given weight above it.

$$\underset{342}{\overset{0.269}{C_6H_{12}O_6}} + C_6H_{12}O_6 + \underset{12 \times 22.4}{\overset{x}{12O_2}} \rightarrow 12CO_2 + 12H_2O$$

$$\frac{0.269}{342} = \frac{x}{12 \times 22.4}$$

$x = 0.211$ liters of oxygen

But oxygen occupies only 20 per cent or one fifth of the volume of air; therefore to obtain the volume of air to be breathed we multiply the number of liters of oxygen by 5.

$5 \times 0.211 = 1.06$ liters of air

The athlete, therefore, must breathe in 1.06 liters of air. For the sake of more complete comprehension let us convert this figure into English units. There are (physics has told us) 28.3 liters per cubic foot volume. The number of liters divided by this number will give the quantity of cubic feet of air the athlete must breathe.

$$\frac{1.06}{28.3} = 0.0373 \text{ cubic feet}$$

He must inhale 0.0373 cubic feet of air to oxidize the sugar utilized to climb the rope.

By a similar process we can calculate the amount of carbon dioxide the athlete exhales. For this we place an x over the CO_2 in the above equation and the coefficient 12 below it. Over the O_2 we place the volume 0.211 liters and beneath it, its coefficient.

$$C_6H_{12}O_6 + C_6H_{12}O_6 + \underset{12}{\overset{0.211}{12O_2}} \rightarrow \underset{12}{\overset{x}{12CO_2}} + 12H_2O$$

$$\frac{0.211}{12} = \frac{x}{12}$$

$x = 0.211$ liters of CO_2

We have solved our problem: the athlete will exhale 0.211 liters of CO_2, a volume equal to that of the oxygen inhaled.

To summarize the facts, we have found that a 150-pound man to climb a 20-foot rope must eat the equivalent of 0.04 teaspoons or 0.255 grams of sugar and inhale 0.211 liters of oxygen or 0.0373 cubic feet of air. He will exhale a volume of carbon dioxide equal to that of oxygen inhaled plus the unused parts of air, amounting to 0.0373 cubic feet.

SKELETAL TEACHING MATERIAL

Skeletal teaching materials of the ox, sheep and horse are valuable to illustrate problems of the human types, and such material, together with teeth, is always of striking interest.

The large bones, especially the femur and humerus (propodial elements) and the ulna, radius, tibia and fibula (epipodial elements) can be obtained, uncut, from meat shops, placed in warm water, changed every two hours, until maceration sets in so as to allow cleaning with a brush or cloth. Do not scrape with an edged tool.

The adult animal will supply specimens large enough to use in class lectures. Several additional specimens placed at close range among groups of eight students give brilliant results in demonstration of architecture, leverage and support. Eyestrain developed by the usual small frog bones is avoided. We may wonder, also, why an articulated skeleton of a cow, or sheep, is not more often found in a schoolroom or hall. Going to a museum, students at once examine the great skeletons, as these are easy on the eyes and appeal by their size and adaptation. Even an articulated extremity of a sheep, cow or horse is a good laboratory example. Fresh, wet specimens of a foot, with its tendons and ligaments in place, are readily obtained from butchers. The wet specimen may be desanguinated in cold water, with one-

half per cent sodium chloride (table salt). It is then placed in one per cent phenol (carbolic acid) solution, changed a few times, day by day, to impregnate. Some glycerin or alcohol is added to the final one per cent phenol and water, to preserve and to be an antidote for any phenol burn. The glycerin softens and preserves, and should not be excessive. Soak the specimens in clear water before supplying for class use. Such specimens may be preserved indefinitely, changing the phenol solution each year.

The bones, cleaned and dried, may be kept in closed boxes, after exposure to sunlight, using camphor or moth balls to repel pests with biting mouth parts (beetles, etc.). These bones should be aired for 24 hours before supplying to students for class use, as comphor may react on the nasal mucosa.

The use of chicken, duck or turkey material will supply splendid ulna and radius bones. A sufficient number of specimens shortens teaching time. Trays or glass dishes are an advantage when sets of small mesopodial bones are issued to groups of students. Matching them is really fine sport.

If young calf bones can be obtained, the ends of the long bones are detachable on macerating in warm water; matching these ends to their respective shafts is very interesting, as each one fits only its own shaft. This illustrates the bone growth at the epiphysis. The same occurs in the human being, and in the same way, for the epiphyses are of the same conformation.

Good radiographs of the human hand, foot, and other skeletal parts are sometimes obtainable, and may be enlarged by the photostatic process.

Whenever students have large specimens at hand, they react favorably. Class work becomes instantaneous.

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STUDENT ARTICLES

The paper on *The Mathematics of Digestion*, page 33 of this issue, was written by a student of Associate Editor Charles C. Herbst, of Beverly Hills High School, Beverly Hills, California, and submitted by him. No doubt there are among our readers other teachers who have students' term papers or other writings of sufficiently high quality of thought and expression to make them suitable for publication.

YOUR MEMBERSHIP

1. Membership in *The National Association of Biology Teachers* is a direct and unique contribution to what the biology teacher professes to be his main interest and what he is paid to do—it gets more and better biology into the minds of American youth.

2. This membership supports the only national journal devoted solely to the purposes and needs of the teacher of biology; THE AMERICAN BIOLOGY TEACHER can serve biology only as ably as this membership determines.

3. This membership and journal must increase in strength and influence if biology teachers are to share effectively in the struggle to gain or to retain the greatest usefulness of life science in popular education. The War has brought about more instability in the high school curriculum. In the immediate future biology teachers have a special responsibility to work and will and to serve a people; as science teachers we must see this means to work *together*.

Editorial Comment

THE ARMED FORCES INSTITUTE

The following rather lengthy quotations from a recent article by Ralph W. Tyler* merit the careful attention of all biology teachers: "Many men and women in the armed forces are making substantial additions to their educational development as a result of their military experiences. They find three types of opportunity for educational growth while in the Army or Navy. In the first place, the armed forces provide a vast program of technical training. It is estimated that 63 per cent of all the men and women in the Army and a larger percentage of the naval personnel are given some type of technical training, . . .

"A second source of educational development available to the armed forces is the program of off-duty education. All branches of the service participate in the work of the *United States Armed Forces Institute*, formerly called the Army Institute, which has its headquarters at Madison, Wisconsin. . . .

"The Armed Forces Institute provides correspondence instruction under two plans. One plan enables a member of the armed forces to enroll in correspondence courses offered by 80 recognized colleges and universities. Under this arrangement the student pays only a part of the tuition while the balance of the cost is borne by the Institute. The instruction, however, is handled in the usual manner by the college or university offering the course. Under the second plan, courses, most of which are at the high school level, are offered directly by the United States Armed Forces Institute. . . .

"The third type of educational opportunity is informal. For many members of the armed forces the informal experiences of military life will contribute in greater or less degree to their education. Some, no doubt, will increase their knowledge of geography through wide travels. Others will get some conceptions of anthropology as they come in contact with cultures markedly different from their own. Some in the medical corps will undoubtedly learn something of anatomy, physiology and elementary chemistry. Although these informed experiences may be minor in their effects on educational development for the majority, there is no doubt that they will influence the educational maturity of many men and women.

"When members of the armed forces return to civilian life a considerable number will want to continue their education. . . .

"Recognizing the need for a more rational plan (1) for placing members of the armed forces on their return to educational institutions, (2) for granting appropriate credit for educational attainment while in military service, and (3) to motivate the educational work of the soldier and sailor, a special committee of educators recommended to the Armed Forces Institute that a procedure be provided which would enable members of the armed forces to demonstrate their educational attainments so that educational institutions might give proper recognition and fair credit. The committee pointed out that the educational work in the Army and Navy could

* Tyler, Ralph W. *Appraisal of Military Training and Experience*, Journ. Am. Assn. of Coll. Registrars, July, 1943.

not be satisfactorily evaluated in terms of textbooks used, academic training of staff, hours spent in study, and other similar features sometimes used in accreditment of civilian institutions. . . . Acting on the recommendation of this committee the War Department contracted with the University of Chicago Board of Examinations to prepare tests and examinations for this purpose. . . .

"The Examinations Staff has been directed to construct four types of examinations, only two of which are primarily to serve as a basis for placement and credit. The first type includes the tests given students at the completion of courses taken in the Institute. . . .

"The second type includes field or certifying examinations. Tests of this type are built to measure the man's competence to deal with the material commonly provided in high school or college courses or fields. For example, the field examination in high-school physics covers the content commonly included in high-school physics and attempts to measure the degree to which the objectives commonly emphasized in high-school physics courses have been attained. . . .

"The third type of tests constructed by the Examinations Staff includes the tests of *General Educational Development*. . . . Two batteries have been developed, one for the high-school level and the other for the college level. They have been prepared for immediate use in the placement of casualties returning to educational institutions. . . .

"The fourth type of test will be of use only in certain individual cases. These are tests constructed specifically to measure the soldier's competence in certain highly technical fields of special military importance. . . .

"This brief description of the work of the examinations staff for the United States Armed Forces Institute should suggest the possible values of this program in facilitating smooth transition from military to civilian life. . . . A large proportion of our youth have had their education interrupted in order to serve their country. The success of this country as a democracy largely depends upon the educational level of its citizens. If we can develop a plan which will encourage men and women in the armed forces to continue their education when they return from the war, a plan which gives them fair credit and places them at a point where they do not duplicate previous learning nor find themselves floundering in new and too difficult work, a large part of this group whose education has been interrupted may have a chance to complete it. This is an important contribution to our national life."

It is most important that teachers in the field become acquainted with a general program such as that outlined above, and especially with those portions of it that are directly in their own professional subject fields. Some long-range plans are involved here, but certain phases of the work are problems for the immediate future. Alert teachers should be thinking at all times about the future of the education of the youth whose education has been interrupted. THE AMERICAN BIOLOGY TEACHER will print in an early issue, possibly in the December number, an article by Shailer Peterson, describing the above-mentioned High School Biology Test. Our readers can and should familiarize themselves with this testing program, the types of skills represented by the test items, the organization of subject matter, and other similar problems, to the end that they can make their own courses more functional.

A LETTER TO OUR READERS

To All Readers:

A personal letter from the editor to each reader is of course impossible; I hope however that many of you will consider this letter personal to the extent that you will write me in answer to it. Matters of editorial policy and practice are important to you, for the journal after all belongs to its readers and not to its staff. What the editors put in the journal is determined to a large extent by what they think the readers want. This letter is a report to you, the readers, and a discussion of some of the more important of our mutual problems.

The majority of you are high school teachers of biology, or of biology and related subjects. Most of the editorial staff consists of high school teachers, and somewhat more than half of the contributions to the journal come from high school teachers. A few issues have been written more largely by college authors, but these were exceptions, as for example, the special issue on *Vocational Biology*. Obviously this is a field in which most of the data are in the hands of university and government personnel, so the articles in this field came from these sources.

From letters you have written and from various other lines of evidence I judge that you are interested mostly in teaching aids, short articles on teaching units and content, short reviews and other practical materials. As a rule you care less for philosophical or technical papers and for reports on original research. But we have a fairly large minority of readers who do like the latter types of reading matter, so it seems fair to publish occasional papers dealing with research or the philosophy of biology teaching.

During the early spring I addressed a circular letter to all associate editors, officers and members of the advisory staff; this met with very good response. Many helpful suggestions and criticisms were included in the replies, some of which were written in much detail. There was general approval of our articles, both as to length and general nature, of biological briefs, book reviews, notes and news and editorial comment.

Biological briefs and book reviews were crowded out of the October issue, but are present again in this one, and will be regular features in the future, as they have been in the past. A demand for shorter comments on a larger number of publications between the magazine article and the ordinary book has led to the *Recent Publications* column, page 43 of this issue.

By The Way, started last year, grew out of a similar demand for practical short items that might be helpful to the teacher in everyday service, but are not extensive enough to warrant separate articles. Such a column can be kept up only if the readers continue to send in the necessary items; these cannot be dreamed up by the editor. Many of these items are seasonal, and arrive too late to be used in the same year; if you send in an item to be used in April, for example, it should be in my hands in early February. Thus far, items have come in at about the rate at which space permits their publication.

Formulas for Biological Science, page 47 of this issue, is the result of such letters as "Where can we find the formulas for the common solutions biology teachers use every day?" "Why don't you print in each issue a few of the common biological formulas, especially some of the unusual ones we can't find just any place?" and the like. This also is a department that only you can

keep going, so if you want it continued send in your pet formulas.

The suggestion has come several times that we expand our activities so as to include the elementary school level. With the growth of elementary school science, it seems possible that there are many teachers in the lower grades who might benefit from much of the material in our journal and that we should make a definite effort to have something for them. The board at the Chicago meeting passed a resolution authorizing the editor to make such adjustments to the elementary level as could be done without detracting from the general purpose and aims of the journal. I am not sure just what this may mean in actual practice. I should like your reactions to this whole idea—much of it came from you in the first place. To date, very little material along this line has come to my desk. I should appreciate a general article setting forth some actual experiences of a teacher in the elementary field.

Much has been said about strictness of editorial policy; there was considerable difference of opinion among those who replied to my circular letter. Some thought our policy was too strict in both form and content; others thought it was too lax in both respects; there were many shades of opinion between these two.

It is true that many manuscripts are sent back to their authors, but this does not necessarily mean too strict a policy. The editor makes no corrections without the author's OK, except in the case of minor and obvious slips. Sometimes manuscripts are excellent in content, but in such form as to be unsuitable for publication; in other cases they are in perfect form, but with omissions of content that make them undesirable as they stand. The author himself is so familiar with his subject matter that he may come to assume certain knowledge on the part of his readers. The editor reads such a paper and immediately questions arise in his mind; he notes these in the margins and returns the paper; the author answers the questions by inserting the necessary sentences and phrases, and an excellent paper is the result. Of course this is only one example of what may happen. Some of our finest papers have been among those we have returned to the authors even a second time.

It must be borne in mind that it is no reflection on a manuscript to be sent back with a large number of notations. This only means that the editor thought the article of sufficient importance and interest to invest a lot of time and thought in it. And sometimes the author in his reconsideration makes improvements that had not occurred to the editor at all.

Many of you have had no previous experience in writing for publication; this is as it should be. One of the purposes of a journal such as ours is to give interested persons an opportunity to express themselves, and this includes beginners as well as experienced writers. The name, THE AMERICAN BIOLOGY TEACHER, indicates that it belongs to all of us who teach biology, whether we teach a single biology class in Podunk High School or are a specialist in some small field of biology in a great university. Every now and then I receive a manuscript accompanied by a letter which says "I hesitate to send this; it is my first attempt to break into print" or words to that effect. Often such papers are substandard in form, not because of lack of inherent value, but because of incomplete knowledge of details of publication. The content is often of the very best, because the new author sometimes has a brand new idea and an enthusiasm for expressing it that may be lacking later. It is hoped that reference

to *Preparation of Manuscripts for Publication*, page 20 in the October issue, may enable the new author to avoid most of the common difficulties. Some of you have been frightened by the apparent technicalities—there is no need of this at all. Every manuscript receives careful and sympathetic consideration, no matter whether it is perfect or impossible in its original form. If you have never written for publication but have an idea you think worth while, do not let your lack of experience stand in your way.

The special issues have been popular. The series is being continued, but in the absence of annual meetings, it is somewhat difficult to get committees set up for such important tasks. Suggestions are welcome at all times and in all fields, but especially in this one. And don't be afraid to volunteer; perhaps you have some ability or interest of which no one in an official capacity happens to be aware.

There was considerable agreement in the replies to my circular letter that we do not have enough good illustrations. With this statement I agree, and with this problem I want your assistance whenever you write an article that lends itself to illustration. One of our greatest difficulties is to get good pictures for illustrating papers. Sometimes when a picture which cannot be reproduced successfully is returned, the author instead of sending a better picture, revises the manuscript so as to delete the references to the illustration. In other cases the author does not send an illustration because he "can't draw and never could." It is our hope that the study of the illustrations in *Preparation of Manuscripts for Publication* may help authors to provide more and better illustrations for their manuscripts.

There have been several suggestions that we establish a department for the beginning teacher. Of course, as one of the associate editors said when this subject was discussed, "The larger portion of every issue should be of special interest and value to the beginner," but we are now thinking of a special department, headed *The Beginning Teacher*, *The Beginner*, or something of that nature. What do you think of the idea? Especially you who are beginners? If you are interested in this move, won't you write me and express your opinions as to what should be included, what should be the title, how often it should appear, and anything else that occurs to you?

Along somewhat the same line, many have suggested that there be a *Letters to the Editor* department. This was discussed at some length, with the conclusion that for the time being the editor should print occasional letters or portions of letters which might be of particular interest, but that the present size of the journal does not permit the "open forum" type of department.

We need a larger list of subscribers. The officers and advisory staff have given a good deal of thought to this problem, from the very beginning of the Association and the Journal. The war has greatly increased the proportions of this problem. A membership committee is at work, as described in the October issue. Miss Knauz and her group are doing an excellent piece of work in this most important task, but they need the help of every interested reader of THE AMERICAN BIOLOGY TEACHER. Tell your friends about our journal and show them copies of it. Call their attention to its varied features and its possibilities. The first fundamental of a good journal is a large active interested membership.

We need more advertising. This also is a field where you can do something to help. You can be sure to mention THE AMERICAN BIOLOGY TEACHER whenever you answer one of the advertisements in the journal. You can, whenever you have the opportunity, support with your

business and influence those who support us with their advertising. This is to our mutual benefit. And if you know of some firm that should be advertising with us and is not, you make your suggestions to Managing Editor Price. The second fundamental of a good journal of the type of ours is a strong active interested list of consistent advertisers.

On the principle of leaving the best for the last we come now to our most important current subject—the role of biology in the war effort. We have published a special issue on *National Defense*, the April 1942 number, and have printed one or more "war articles" in almost every issue since that time. There has been considerable demand for another special issue on war biology, but the editorial board has decided it would be best to publish acceptable articles in this field as promptly as possible. A special issue entails considerable delay in planning and execution, especially now that we are not having conventions. So if you have contributions to this important phase of biology, send them promptly to me or to any of the associate editors. You do not have to write a long article presenting a full course in war biology, a set of teaching units or the report of a committee. You may have some workable idea for a visual aid, a correlation with some other subject, a bit of teaching technique, a list of references you have found valuable, a laboratory substitute for some critical material or something else that takes only a paragraph to place on record in the journal which you share with your fellows. And don't forget that we are fighting two wars, in the words of Rugg "tomorrow's war at home, today's war abroad, and these two wars are one. To speak of the peace now is to win the two wars." The one war ends when the soldiers leave the battlefields; the other continues. We must win the peace as well as the war. Science teaching has an important contribution to both. You, as teachers of a fundamental science, have ideas which may help present day high school pupils to win both wars—share your ideas through the columns of THE AMERICAN BIOLOGY TEACHER.

There are many other matters of importance that I should like to discuss with you, but I have already taken far too much space in a crowded issue. Accept my apology for that—and send me whatever suggestions you have for the good of the order.

Yours for a successful and useful future for THE AMERICAN BIOLOGY TEACHER,

JOHN BREUKELMAN

FALL MEETING OF REPRESENTATIVE ASSEMBLY

As announced in the October issue, *The Representative Assembly* will meet in Chicago November 27, as voted at the last meeting, held April 24, 1943. This Assembly will be a business meeting, to take the place of the December convention, which we will again be unable to have this year. Members of the Representative Assembly are; Officers of the Association, members of the Editorial Board, members of the Advisory Board, all past presidents, delegates from each affiliated local, and chairmen of all standing committees. The entire meeting will be held at the College Club, 30 North Michigan Avenue, beginning at 9:30 A.M.

The purposes of the meeting are:

1. To examine our financial status and see whether proper measures are being taken to insure financial security.

2. To consider the appointment of a Committee to contact Local Associations. This committee should study ways and means of strengthening the bonds between the Locals and the National Association, for their mutual benefit.

3. To consider how the National Association may increase its services to individual natural science teachers.

4. To appoint a nominating committee and to make plans for conducting an election for next year's officers, unless the Representative Assembly rules otherwise.

5. To consider items submitted by members. Members are invited to send suggestions to the president regarding further items to be considered at this meeting.

AGENDA

9:30 A.M.	Call to order
	Report of the Secretary Treasurer—Dr. G. W. Jeffers
	Report of the Membership Committee Chairman — Marie Knauz
	Report of the Managing Editor—Chas. B. Price
	Consideration of Purposes 1 to 5.
12:30 P.M.	Luncheon at College Club. Speaker—Dr. Carroll F. Birch Subject—*Tropical Medicine*
3:30 P.M.	Editorial Board Meeting
6:30 P.M.	Dinner at College Club
7:30 P.M.	Executive Board Meeting M. A. RUSSELL, *President*

COMING SOON

Next month look for the article by Shailer Peterson on the biology tests of the United States Armed Forces Institute, the first of the series of 8-page units on Conservation, from the conservation committee, headed by E. Laurence Palmer, and many other interesting features. The January issue will be devoted to Ornithology; word has been received from the chairman of the Ornithology Special Issue that the manuscripts are excellent, that there are several topnotch photographs and many teaching helps.

SOUTHERN CALIFORNIA ASSOCIATION OF LIFE SCIENCE TEACHERS

The Southern California Association, under Mrs. Gjertrud Smith, is enjoying an active and busy year. Following is an abridgement of the summer meeting of the executive board of the association:

1. Report and discussion of meeting with the supervisor of the curriculum section of the Los Angeles City Schools. Among other things discussed was the contribution that life science could make to wartime education.

2. Report of activities of the Corresponding Secretary, Mrs. Anna Marie Pratt. Among the problems considered is that of unifying the membership drives of the national and local organizations.

3. Appointment of membership chairman. Mr. John Arnold of University High School was unanimously approved.

4. Discussion of October Institute Meeting. The entire theme of the meeting was to be *War and Disease*. The city and state health departments agreed to participate.

5. Discussion of Sex Education Study Groups. Consideration of study groups in which techniques of teaching and latest information in the general field might be discussed. The State Department of Public Health has been sponsoring such groups and sending speakers.

PAUL B. MANN

It is with deep regret that we announce the passing of our First Vice President, which occurred October 22, 1943. Mr. Mann was active in the initiation of *The National Association of Biology Teachers* and THE AMERICAN BIOLOGY TEACHER, having been a member of the advisory staff since the beginning of the association and journal in July, 1938.

The following biography of him appeared in the election notice in the February, 1942, issue: A.B., A.M., Cornell University, where he later taught zoology; teacher, College of the City of New York, 8 years; head of Biology Department, Evander Childs High School, 27 years; Supervisor of Science in senior high schools of New York City 1936–38; on staff of American Museum of Natural History 1928–38; past president, New York Association of Biology Teachers; Member New York Academy of Sciences, American Association for the Advancement of Science; biography in Who's Who in America, American Men of Science; author of *How to Tell the Weather*, *Out of Doors*, *Biology for Beginners*, *Biology* (the last three in collaboration).

Mr. Mann represented our Association at the *National Wartime Conference* of the Professions, Sciences and Arts, and was chairman of the Steering and Education Committee of this Conference. He took charge of the arrangements and had done most of the preliminary work for the national 1942 convention, which was cancelled at the request of the Office of War Transportation. He had been a contributor to our Journal, directly and indirectly, from its beginning. His active service, keen interest, friendly counsel and wise advice will be sorely missed.

RECENT PUBLICATIONS

DAVIS, D. DWIGHT, AND STORY, H. ELIZABETH. *The Carotid Circulation in the Domestic Cat.* Field Museum of Natural History, Chicago, Illinois, Zoological Series, Vol. 28, No. 1, 1943.

For the vertebrate anatomist or teacher of comparative anatomy. A thorough revision of carotid specializations in the cat. Interesting discussion and summary.

MARTIN, PAUL S. *The Su Site Excavations at a Mogollon Village, Western New Mexico.* Field Mus. Nat. Hist. Anthropological Series, Vol. 32, No. 2, 1943.

A 271-page description of an important archeological investigation, with more than 90 excellent photographs and 23 maps, as well as many tables, summaries and charts.

Annual Report of the Director. Field Mus. Nat. Hist. Report Series, Vol. 13, No. 1, 1943.

Report of publications, maintenance, accessions, public relations, and many other phases of the operation of this important institution. Several excellent full page photographs add to the interest of the report.

ROE, ANNE. *A Survey of Alcohol Education in Elementary and High Schools in the United States.* Quarterly Journal of Studies on Alcohol, New Haven, Conn., Sept. 1943.

A 132-page study, in two parts: Teaching Practices and Teaching Materials, and The Legal Regulation of Alcohol Education. Bibliography of textbooks, bibliography of state laws, reference list, 34 tables.

American Society for the Control of Cancer. 350 Madison Avenue, New York, N. Y. Miscellaneous Teaching and Reference Materials.

Examples of titles available: A Lesson Plan on Cancer, Health Heroes—Marie Curie, Cancer, Statistical Charts, Youth Looks at Cancer, The Fight on Cancer, Value of Research with Animals, Answers to the Public's Questions on Cancer. Some free of charge, others at a price of 1 to 10 cents. *E.g., Youth Looks at Cancer* is a 55-page booklet, with an index and numerous pictures, at a price of 10c. A list of available titles will be sent free to any interested teacher.

Health and Liquids—An 8-page pamphlet, by American Bottlers of Carbonated Beverages, 1128 16th St., N. W., Washington, D. C.

Includes sections on health, importance of water, absorption and loss of water, liquid intake and thirst, increasing liquid intake, bibliography.

Science and the War—Published by the Kansas Academy of Science, Lawrence, Kansas, April 1943.

A symposium presented at the 75th anniversary meeting of the Kansas Academy of Science, dealing with the fields of food, physics, bacteriology and medicine, chemistry, botany, geology, zoology, psychology and entomology as related to the war effort.

Books

BAYLES, ERNEST E., BURNETT, R. WILL. *Biology for Better Living.* Silver Burdett Co., New York. 754 pp. 1942. $2.28.

Mechanical Make-up: The most distinctive features of this textbook is its extraordinary departure from the academic illustration, the staid legend to illustrations, its mechanical construction. Other factors are important, but when a text becomes a fascinating sequence of picture, diagram or chart research it has won a point. The student will read the text.

The text is a $6\frac{1}{2} \times 9\frac{1}{4}$ inch heavy volume with a black unadorned, sturdy cover. It has an electric-photo offset type printing with dramatic pictographs, stimulating drawings, pictures and graphs. Many excellent cuts have been borrowed from the motion pictures. These as well as others from the U. S. Department of Agriculture and other sources has made the text exceptional.

The sketches and black-background diagrams are also unusual in their clarity. Besides supplementing the printed text by making it more understandable they portray biological facts and generalizations in an interesting manner.

Subject Matter: There are light units covering such major ideas as care of wounds, fractures, chemical poisoning, animal bites, sedatives, stimulants, etc. This is very timely in supplementing the First Aid work sponsored by the Red Cross and other agencies. In addition, heart disease, cancer, pneumonia, tuberculosis, mental diseases and disorders, etc., have been given proper recognition in the improvement of the nation's health. The study of conservation has also been given proper recognition. Subjects such as pest control (insects and fungi), wild life conservation, soil erosion, crop rotation, forestry, etc., have been adequately discussed. Heredity and evolution are not presented in the conventional manner. Emphasis is placed on the changes brought in Nature by man. Man's influence upon his environment is clearly shown.

Literary Style: The language is simple enough for the average high school student, yet the material is so well presented that any student will find it enjoyable reading. The

scientific vocabulary has been reduced to a minimum. The terms used are italicized and accompanied by the definition, either in the body of the text or within parentheses. At the end of each chapter the usual questions, etc., are listed under *Using What You Have Learned.* These are two typical examples of the psychological principles the authors have employed to make the text more interesting. The *Projects, Activities, and Investigations* are well chosen, a very important phase of a well-balanced biology course. The interpretation of the more common facts concerning plants and animals, and the bettering of man's environment are the two basic principles emphasized by the authors.

Learning Aids and Teacher Helps: One of the first principles which a science student must learn is that individuals can and do make errors in thinking, but conclusions arrived at due to the efforts and findings of many individuals are much more apt to be accurate. In Chapter 5 we find several theories advanced, and by scientific men of their day, as to how green plants obtain food. Gradually through eliminations and additions, the student learns that these scientists have given us the process of photosynthesis.

Much of the zest of reading and experimenting is lost, if the content is clearly represented in pictures, or, if the results of the experiment are indicated even before the investigation begins. On page 447 we have an illustration of a doctor working over a patient. Your attention is arrested at once, but when you read the legend, "On what theory was blood-letting based?" you are truly anxious to *read.*

On page 417 we have a typical example of an illustration used to stimulate reflective study. The boy, who might be any one of the students, must make decisions concerning four situations, such as occur in the daily life of most youths. The factors he must consider are indeed a challenge.

To understand better the rapid changes which have taken place in the world, due to science and technology, the student has but to read Chapters 28, 29, 30, to see that these changes are normal, but that if they are to be met satisfactorily, long-range planning is necessary.

If a boy or girl should study the graph on page 546, where ignorance is contrasted with medical advice perched on the ladder of special activities, he or she will naturally draw varied conclusions; then as the eye falls on the caption in dark ink, "Can we afford slums?" personal and community problems come to mind.

The *"You Will Enjoy Reading"* lists at the close of each chapter are a particular delight. These lists are long enough and sufficiently varied to meet the individual student's interest.

Procedure throughout from the familiar to the unfamiliar, always using real, alive, and useful material makes this a most stimulating text.

ALAN A. NATHANS (Chairman)
JOSEPH RHODES, Iowa

FITZPATRICK, FREDERICK L., and STILES, KARL A. *The Biology of Flight.* The Macmillan Company. 1942. 162 pp. $0.64. *Teacher's Manual for The Biology of Flight.* Above authors and Publisher. 1942. 27 pp. $0.20.

This small volume is full of practical information systematically arranged in eight chapters covering the biology applicable to aviation. The first chapter is devoted to a discussion of the adaptations of plants and animals for aerial locomotion. The succeeding chapters stress the biology concerned with the following: The Nature of Flight; Altitude Effects; Other Pressure and Temperature Effects; Acceleration and the Human Body; The Sense Organs and Flight; Physical Fitness for Flight; and Air Travel and Disease Control. A brief summary follows each chapter. We have here a book which is a valuable and needed contribution to biology students who are air minded. The clarity of the description is enhanced by the illustrations which are plentiful and excellent in design and reproduction. A teacher's manual suggesting techniques for using the text is provided. Also, a bibliography of many selected references and, in addition, selected motion pictures are offered.

LEE R. YOTHERS,
Rahway High School,
Rahway, New Jersey

WHITNEY, DAVID D. *Family Treasures.* The Jaques Cattell Press, Lancaster, Pennsylvania. 299 pp. illus. 1942. $3.50.

Here is a straightforward book about the heredity of man. It tells its story in clear language, with as few "big words" as is consistent with accurate presentation of the subject. The outstanding feature is the more than 200 excellent photographs. The verbal descriptions and discussions have been kept brief, allowing for more space for the photographic record. This is the kind of book that both amateur and professional can read with profit. It is as free from half truths as a semi-popular book can hope to be. Hereditary traits are traced individually through several generations, with frequent references to the pictures, to illustrate points at issue. The chapters deal with the family; the individual; the hair; eyes; mouth, lips, teeth and tongue; ears; nose, cheeks, chin and jaws; hands; feet; body; temperaments and special abilities; health; birthmarks, acquired char-

acters and diseases; sex; the nature of man. The final one includes a 2½-page list of dominant and recessive characters, with references to the pictures illustrating each trait. At the close of each chapter is a group of selected readings and a list of references. The entire book is so arranged and organized as to make it easy to find any certain item. Both the glossary and index are adequate and well arranged. This book would be a valuable addition to any high school or college library.

MUÑOZ, FRANK J., AND CHARIPPER, HARRY A. *The Microscope and Its Use.* Chemical Publishing Co., Brooklyn, N. Y. xii + 334 pp. illus. 1943. $2.50.

Although this book is referred to by its publishers as "a technical book on the microscope in non-technical language," the average biology teacher would probably find it fairly technical. This is of course nothing against the book—the microscope is a technical instrument, and the authors, a technical microscope consultant and a teacher of biology, present a clear and concise description of the instrument and its uses. The opening chapter, on the evolution of the microscope, is specially interesting, including much material not easily found elsewhere. The treatments of the modern microscope and of the errors in its use seem to concern themselves to a large extent with situations which the average teacher is not likely to encounter very often. The discussion of the microtome contains a large amount of practical information. Besides those mentioned, there are chapters on illumination, use and care, stereoscopic, metallurgical and polarizing microscopes, and accessories. The illustraitons are excellent throughout; in many cases they help to clarify difficult points which in most books are left vague or omitted. There is an extensive glossary, a carefully selected list of references and a well-organized index. This book would be useful wherever microscopes are in regular use.

MAYR, ERNST. *Systematics and the Origin of Species.* Columbia University Press, New York. 334 pp., illus. 1942. $4.00.

The author, a noted ornithologist and evolutionist, presents a comprehensive account of the effect of genetics on taxonomy and of both genetics and taxonomy on modern trends of thought in evolution. This has been a neglected field; not many biologists today are familiar with the profound changes that have occurred in the methods of taxonomy, and particularly not with the many ramifications of these changes.

The chapter headings indicate the general scope of the work: 1. The Methods and Principles of Systematics, 2. Taxonomic Characters and their Variation, 3. Phenomena of Geographic Variation, 4. Some Aspects of Geographic Variation, 5. The Systematic Categories and the New Species Concept, 6. The Polytypic Species, in Nature and in Systematics, 7. The Species in Evolution, 8. Non-geographic Speciation, 9. The Biology of Speciation, 10. The Higher Categories and Evolution.

Writing in this field becomes "heavy" at times—this could not possibly be avoided without omitting important concepts—but this book is clearly written and logically developed, with no great reader knowledge of systematics presupposed, so that anyone with an average background and interest in biological science can read it intelligently.

The mechanical makeup is attractive and the typographical arrangements such as make for easy reading. The 29 figures and 14 tables present much valuable reference material. There is a 16-page list of references and an unusually well organized index. This book should be widely read by biologists and biology teachers everywhere.

JOHN BREUKELMAN

Biological Briefs

ZAHN, CURTIS. *America's First Air Mail.* Natural History 52: 3, 132–3. October, 1943.

What was probably the most highly organized pigeon carrier service in history came and went, without much notice, during the California gay nineties, operating from 1894 to 1898. The service was operated on a strict timetable, from Catalina Island to Los Angeles, the birds leaving the resort of Avalon at 2:00 P.M. daily and arriving at Los Angeles about an hour later, having covered a distance of 48 miles. The pigeons carried letters (onion-skin paper) and messages of all sorts. The fee was 50¢ to $1.00 per 25-word message, depending on the time of day the message was filed. There were many hazards; hawks were numerous and hunting was popular. It became necessary to pass a state law declaring pigeon shooting illegal. The birds arrived at a loft in downtown Los Angeles, from which messenger boys were dispatched to the recipient's address. The *Los Angeles Times* sent a column of news daily. Doctors were sometimes summoned for emergency cases by this novel "air mail." The proprietors of this venture were Otto J. and O. F. Zahn, father and uncle respectively, of the author of the article here briefed.

BURKHOLDER, PAUL R. *Vitamins in Edible Soybeans.* Science, Vol. 98: 198. August 27, 1943.

Present indications are that it may be necessary for us to rely more and more on plant foods as substitutes for animal proteins. Soybeans, which in this country have been used only for specialty items, have been basic in the Chinese diet for thousands of years. From this great natural experiment much may be learned. This paper reports a series of experiments on vitamin content of both the fresh beans and the dry mature ones. The vitamin values of soybeans compare favorably with wheat and with meats except that riboflavin and nicotinic acid in the beans are lower than in meat. It is interesting to note that the concentration of nicotinic acid in the green beans is almost double that in the mature ones. The vitamins investigated were thiamin, riboflavin, pyridoxine, biotin, niacin (nicotinic acid), pantothen (pantothenic acid) and ascorbic acid. The varieties of soybeans tested were Aoda, Bansei, Giant Green, Hokkaido, Toku and Willomi. The vitamin contents of the six varieties were not markedly different.

WILSON, CHARLES MORROW. *Quinine—Reborn in Our Hemisphere.* Harper's Magazine, August, 1943.

Since the Japs grabbed the Dutch Indies they hold more than nine-tenths of the world's established quinine supply; therefore, it is good news that for the first time in half a century the Americas can become independent of Far Eastern sources of this important drug. Guatemala has the most important supplies of harvestable quinine in the Western Hemisphere. Until about 1750 practically all the world's quinine came from forests near the Ecuador-Peru boundary. In 1852 seed collected in Bolivia was sent to Java and by 1920 Java and Sumatra were producing about 97% of the world's supply. Today the American supply is again being built up. There is still no synthetic quinine; both plasmochin and atabrine are proving themselves valuable as tideovers, but neither takes over all the functions of quinine. There is apt to be a spread of malaria when the soldiers return from their jungle battlefields; the importance of the drug in the postwar period must not be underestimated.

MOLDENKE, HAROLD N. *Manila Hemp, The Lifeline of Our Forces at Sea.* Natural History 52: 2, 56–61. September, 1943.

The leading product of the Philippines is a plant fiber of vital importance to the United Nations in the war. Fiber-growing has become one of the most extensive of agricultural undertakings. Nearly 2000 species of plants yield fibers of use to man. Most important of the hard-fiber plants is Manila hemp, which incidentally is not a true hemp and not grown in the immediate vicinity of Manila. The native Malayan name, "abaeá," is less misleading and therefore preferable. The plant, *Musa textilis,* is closely related to the banana, *M. paradisica,* which it resembles in many respects. Some 18 months are required for a new planting to begin yielding fiber. The actual fiber of the abacá plant comprises only 3% to 4% of the weight of the stalk. Thus, for 1000 tons of fiber, it is necessary to transport 25,000 to 30,000 tons of stalks to the decorticating establishments. Speed is essential because the stalks should be processed within 48 hours after being cut. This is done by running them through heavy rollers which crush out the water content. The fiber is then separated from the waste material by motor-driven machinery. In addition to the large plantations, there are many smaller plots being worked by individual farmers, often by their own primitive methods.

WOODWARD, CAROL H. *Creator of Puffed Cereals—and Benefactor of Science.* Jour. N. Y. Bot. Garden, Vol. 44: 173. August, 1943.

"On a shelf in the Members' Room at the New York Botanical Garden, there stands a small square oven bearing a placard which reads in part:

DISCOVERY OF PUFFED WHEAT

"Puffed starch, puffed rice and puffed wheat were discovered at the New York Botanical Garden with this oven by Dr. Alexander P. Anderson, December, 1901.

"The discovery was not accidental but the result of a prearranged experiment on starch granules. Dr. Anderson, then a student working in the laboratories of the New York Botanical Garden, was investigating the effect of confined heat and pressure on starch. As part of this investigation he heated starch grains of wheat and other cereal grains in sealed glass tubes in this oven to a temperature of 400° F. and a pressure of 200 pounds per square inch."

"Food shot from guns" was sold like popcorn to visitors at the St. Louis Fair in 1904. In 1905 puffed rice was established as a breakfast cereal. In 1906 the Quaker Company sold puffed wheat under the name of "wheat berries."

In Dr. Anderson's long career he performed thousands of experiments on the effects of heat and pressure, not only on starch, but on wood, clay and many other products. Many commercial products have resulted from his researches. Some of these were successful enough to enable him to en-

dow The New York Botanical Garden with a fund of $10,000 for research and to arrange for an additional $25,000, part of which has been paid.

Dr. Anderson died in Florida on May 7, 1943, at the age of 80.

FORMULAS FOR BIOLOGICAL SCIENCE

Preserving Solutions

Formaldehyde solutions: The stock solution consists of 40% of the substance in water; this is called formalin. Thus for a preserving solution of 8% formalin, the proportions would be:

Formalin, (40% stock)	8 cc.
Water	92 cc.

For most purposes the preserving strength of this substance should be 8 to 10%, for soft-bodied animals such as frogs, worms, the concentration may be reduced to 5 to 7%. Never use formalin full strength, since it makes tissues excessively brittle.

Alcohol solutions: The stock solution of grain alcohol consists of 95% alcohol and 5% water; the preserving strength is 70% alcohol; the proportions thus would be:

Alcohol, 95%	70 cc.
Water	25 cc.

Insect preservatives: There are many different formulas; the following are in common use:

A.

Alcohol, 95%	75 cc.
Glycerin	10 cc.
Water	15 cc.

B.

Alcohol, 95%	50 cc.
Formalin, 40%	5 cc.
Glycerin	10 cc.
Water	35 cc.

C.

Alcohol, 95%	55 cc.
Glycerin	20 cc.
Water	22 cc.
Glacial acetic acid	3 cc.

Solution C is supposed by many to be less destructive of the colors of insects than other preservatives.

Decalcifying Solutions

1. *Chrome-nitric acid.* Suitable for removing mineral matter from large bones.

Chromic acid	1	gram
Nitric acid	2	cc.
Water	100	cc.

2. *Nitric acid.* Good for preparing heads of frogs, lizards, etc., for removal of brain with ordinary dissecting instruments. Skulls are softened so as to have consistency of cartilage. Entire heads, with gross muscles dissected off, are dropped into solution and left over night.

Alcohol, 95%	67	cc.
Water	25	cc.
Nitric acid, concentrated	8	cc.

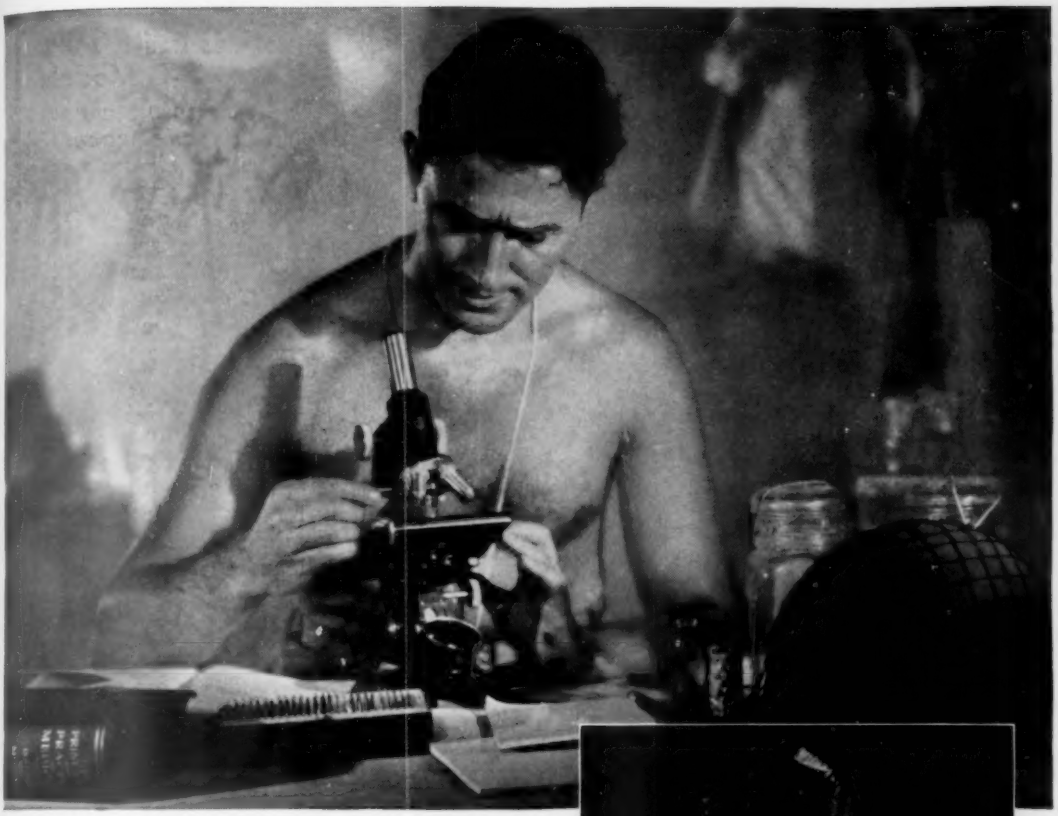
3. *Phloroglucin.* In common use for removal of lime from bones and teeth, for sectioning, etc. Phloroglucin is first dissolved in acid, then water added.

Phloroglucin	1	gram
Nitric acid	20	cc.
Water	100	cc.

Editor's note: This department has been started as a result of suggestions from readers. Other formulas that have been asked for and will appear soon are: Embalming fluids, stains for making microscopic whole mounts without the use of complicated technical equipment, bleaching solutions and macerating solutions. If you have favorite formulas for any of these, or if you have any other pet formulas you would like to see printed in this department, please submit them to any one of the editorial staff.

BY THE WAY

CHLOROFORM WATER is a good killing agent for small water animals; it is made by shaking about 2 cc. of chloroform in 100 cc. of water. This makes a saturated solution of chloroform in water and allows for a slight excess of chloroform. Keep in a tightly stoppered bottle.



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THE AMERICAN BIOLOGY TEACHER

Publication of the National Association of Biology Teachers.

Issued monthly during the school year from October to May.

Publication Office—N. Queen St. and McGovern Ave., Lancaster, Pa.

Editor-in-Chief—JOHN BREUKELMAN, State Teachers College, Emporia, Kan.

Managing Editor—CHAS. B. PRICE, 7449 Stewart Ave., Chicago, Ill.

Subscriptions, renewals, and notices of change of address should be sent to the Secretary-Treasurer, G. W. JEFFERS, Farmville, Va.

The entire Staff List will be found in the October and February issues.

Annual membership, including subscription, $1.50.